UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,377	03/26/2004	Keith A. Tabor	470223.00017	8630

26710 7590 03/07/2007

QUARLES & BRADY LLP
411 E. WISCONSIN AVENUE
SUITE 2040
MILWAUKEE, WI 53202-4497

EXAMINER	
NORTON, JENNIFER L	
ART UNIT	**PAPER NUMBER**
2121	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/810,377	Applicant(s) TABOR, KEITH A.	
	Examiner Jennifer L. Norton	Art Unit 2121	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The following is a **Final Office Action** in response to the Amendment received on 18 December 2006. Claims 1-5, 8, 11, 13, 14, 18, 20, 25 and 28 been amended. Claims 1-28 are pending in this application.

Drawings

2. Applicant's arguments, see Remarks pg. 16, filed 18 December 2006 with respect to the Drawings have been fully considered and are persuasive. Therefore, the objection has been withdrawn.

Claim Objections

3. The amendment to the claims was received on 18 December 2006. The correction is acceptable and the objection is withdrawn.

Claim Rejections - 35 USC § 112

4. The amendment to the claims was received on 18 December 2006. The correction is acceptable and the rejection is withdrawn for claims 1-3, 5, 8, 10, 12, 14, 16, 20, 25 and 28.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 9 recites the limitation "the angular position" in lines 2 and 3. There is insufficient antecedent basis for this limitation in the claim.

Double Patenting

7. Applicant's arguments, see Remarks pgs. 13-15, filed 18 December 2006 with respect to the non-statutory obviousness-type Double Patent rejection of claims 1, 5, 20 and 25 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-7, 9-13, 15-18 and 20-28 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S Patent No. 6,374,153 (hereinafter Brandt).

10. As per claim 1, Brandt discloses a method for controlling movement of a member wherein an angle of the member with respect to a reference is alterable by a first

actuator and a length of the member is alterable by a second actuator, the method comprises:

producing a command which designates a desired velocity that a point on the member is to travel along a desired substantially straight line path (col. 3, lines 20-23 and col. 4, lines 5-10);

transforming the command into a desired first velocity of the first actuator (col. 3, lines 58-61, col. 4, lines 40-44 and Fig. 1, element 140);

transforming the command into a desired second velocity of the second actuator (col. 3, lines 58-61, col. 4, lines 40-44 and Fig. 1, element 150);

operating the first actuator in response to the desired first velocity to alter the angle of the member (col. 2, lines 58-60, col. 4, lines 37-44, col. 7, lines 64 and 66-67 and col. 8, lines 1-5); and

operating the second actuator based on the desired length velocity to alter the length of the member (col. 2, lines 60-63, col. 4, lines 37-44, col. 7, lines 65-67 and col. 8, lines 1-2 and 6-8).

11. As per claim 2, Brandt discloses producing a command comprises designating a first desired velocity that a point on the member is to travel along a first axis (col. 3, lines 16-19 and 23-26 and col. 7, lines 8-12).

12. As per claim 3, Brandt discloses producing a command comprises:

designating a first desired velocity that a point on the member is to travel along a first axis (col. 3, lines 16-19 and lines 23-26 and col. 7, lines 8-12); and

designating a second desired velocity that the point on the member is to travel along a second axis that is orthogonal to the first axis (col. 3, lines 16-19 and lines 20-23 and col. 7, lines 8-12 and 57-61).

13. As per claim 4, Brandt discloses transforming the command into a desired first velocity of the first actuator comprises:

transforming the command into a desired angular velocity for the member (col. 3, lines 16-19 and 58-61 and col. 4, lines 4-13); and

converting the desired angular velocity into the desired first velocity (col. 4, lines 37-44).

14. As per claim 5, Brandt discloses a method for controlling movement of a member wherein an angle of the member with respect to a reference is alterable by a first actuator and a length of the member is alterable by a second actuator, the method comprises:

producing a command which designates a desired velocity that a point on the member is to travel along a desired substantially straight line path (col. 3, lines 20-23 and col. 4, lines 5-10);

transforming the command into a desired angular velocity and a desired length

velocity for the member (col. 3, lines 58-61, col. 4, lines 4-13 and 40-44);

converting the desired angular velocity for the member into a desired first velocity of the first actuator (col. 3, lines 58-61, col. 4, lines 40-44 and Fig. 1, element 140);

operating the first actuator (Fig. 1, element 140) in response to the desired first velocity to alter the angle of the member (col. 2, lines 58-60, col. 4, lines 37-44, col. 7, lines 64 and 66-67 and col. 8, lines 1-5); and

operating the second actuator (Fig. 1, element 150) based on the desired length velocity to alter the length of the member (col. 2, lines 60-63, col. 4, lines 37-44, col. 7, lines 65-67 and col. 8, lines 1-2 and 6-8).

15. As per claim 6, Brandt discloses producing a command comprises designating a first desired velocity that the point on the member is to travel along a first axis (col. 3, lines 16-19 and 23-26 and col. 7, lines 8-12).

16. As per claim 7, Brandt discloses producing a command comprises:

designating a first desired velocity that the point on the member is to travel along a first axis (col. 3, lines 16-19 and 23-26 and col. 7, lines 8-12); and

designating a second desired velocity that the point on the member is to travel along a second axis that is orthogonal to the first axis (col. 3, lines 16-23 and col. 7, lines 8-12).

17. As per claim 9, Brandt discloses transforming the command utilizes the angular position of the member which is derived by sensing a dimension of the first actuator (col. 3, lines 28-33, col. 4, lines 4-10 and 14-17, col. 7, line 7, Fig. 1, element 140 and Fig. 2, element 210 and 220) and converting that position into the angular position of the member (col. 4, lines 37-44).

18. As per claim 10, Brandt discloses transforming the command utilizes the length of the member which is derived by sensing a dimension of the second actuator (col. 3, lines 28-30 and 34-37, col. 4, lines 4-10 and 14-17, col. 7, line 7, Fig. 1, element 150 and Fig. 2, element 210 and 230) and converting that dimension into the length of the member (col. 4, lines 37-44).

19. As per claim 11, Brandt discloses converting the desired length velocity for the member into a second velocity of the second actuator (col. 3, lines 58-61, col. 4, lines 40-44 and Fig. 1, element 150), wherein operating the second actuator is in response to the second velocity (col. 2, lines 60-63, col. 4, lines 37-44, col. 7, lines 65-67 and col. 8, lines 1-2 and 6-8).

20. As per claim 12, Brandt discloses the method as set forth above further comprising:

sensing a first parameter of the machine to produce a first signal denoting the angle of the member relative to a reference (col. 3, lines 31-33 and Fig. 2, element 210 and 220);

sensing a second parameter of the machine to produce a second signal denoting the length of the member (col. 3, lines 34-37 and Fig. 2, element 230);

deriving an actual angular velocity of the member from the first signal (col. 4, lines 18-23); and

deriving an actual length velocity of the member from the second signal (col. 4, lines 18-20 and 23-25).

21. As per claim 13, Brandt discloses the method as set forth above further comprising:

generating a first error value corresponding to a difference between the actual angular velocity and the desired angular velocity (col. 4, lines 31-34 and Fig. 3, element 360);

generating a second error value corresponding to a difference between the actual length velocity and the desired length velocity (col. 4, lines 31-34 and Fig. 3, element 360);

adjusting the desired angular velocity in response to the first error value to produce a corrected desired angular velocity which is employed in operating the first actuator (col. 4, lines 35-44 and Fig. 1, element 140); and

adjusting the desired length velocity in response to the second error value to produce a corrected desired length velocity which is employed in operating the second actuator (col. 4, lines 35-44 and Fig. 1, element 150).

22. As per claim 15, Brandt discloses sensing a first parameter senses a dimension of the first actuator (col. 3, lines 31-33, col. 4, lines 18-23 and 40-44 and Fig. 2, element 220).

23. As per claim 16, Brandt discloses sensing a first parameter senses the angle of the member relative to a reference (col. 3, lines 31-33).

24. As per claim 17, Brandt discloses sensing a second parameter of the machine senses a dimension of the second actuator (col. 3, lines 28-30 and 34-37, col. 4, lines 18-20 and lines 23-25 and Fig. 2, element 230).

25. As per claim 18, Brandt discloses the method as set forth above further comprising:

sensing a first parameter of the first actuator (col. 3, lines 31-33, col. 4, lines 18-23 and col. 40-44 and Fig. 2, element 220);

sensing a second parameter of the second actuator (col. 3, lines 34-37, col. 4, lines 18-20 and lines 23-25 and Fig. 2, element 230);

in response to the first parameter, deriving an actual velocity of the first actuator (col. 4, lines 18-23);

in response to the second parameter, deriving an actual velocity of the second actuator (col. 4, lines 18-20 and lines 23-25);

generating a first error value corresponding to a difference between the actual velocity of the first actuator and the desired first velocity (col. 4, lines 31-34 and Fig. 3, element 360);

generating a second error value corresponding to a difference between the actual velocity of the second actuator and the desired second velocity (col. 4, lines 31-34 and Fig. 3, element 360);

adjusting the desired first velocity in response to the first error value to produce a result which is used in operating the first actuator (col. 4, lines 35-44 and Fig. 1, element 140); and

adjusting the desired second velocity in response to the second error value to produce another result which is used in operating the second actuator (col. 4, lines 35-44 and Fig. 1 element 150).

26. As per claim 20, Brandt discloses a method for controlling movement of a member, wherein an angle of the member with respect to a reference is alterable by a first actuator and the member has a first section that extends from a second section by an amount that is varied by a second actuator, the method comprises:

designating a first desired velocity that a point on the member is to travel along a first axis (col. 3, lines 16-19 and 23-26 and col. 7, lines 8-12);

designating a second desired velocity that a point on the member is to travel along a second axis which is orthogonal to the first axis (col. 3, lines 16-19 and 20-23 and col. 7, lines 8-12 and 57-61);

sensing a first parameter that indicates a position of the member (col. 3, lines 31-33, col. 4, lines 14-17 and Fig. 1, element 210 and 220);

deriving an angular position of the member from the first parameter (col. 4, lines 18-23);

sensing a second parameter that indicates an amount that the first section extends from the second section (col. 3, lines 34-37 and Fig. 1, element 230);

deriving a length of the member from the second parameter (col. 4, lines 18-20 and 23-25);

transforming the first and second desired velocities into a desired angular velocity and a desired length velocity for the member (col. 3, lines 58-61, and col. 4, lines 4-13 and 40-44), wherein that transforming is based on the angular position and the length of the member (col. 4, lines 4-13);

converting the desired angular velocity for the member into a desired first velocity of the first actuator (col. 5, lines 1-13);

operating the first actuator in response to the desired first velocity to alter the angle of the member (col. 2, lines 58-60, col. 4, lines 37-44, col. 7, lines 64 and 66-67 and col. 8, lines 1-5); and

operating the second actuator based on the desired length velocity to alter the length of the member (col. 2, lines 60-63, col. 4, lines 37-44, col. 7, lines 65-67 and col. 8, lines 1-2 and 6-8).

27. As per claim 21, Brandt discloses sensing a second parameter comprises sensing a dimension of the second actuator (col. 3, lines 28-30 and 34-37, col. 4, lines 37-44, col. 7, line 7, Fig. 1, element 150 and Fig. 2, element 210 and 230).

28. As per claim 22, Brandt discloses converting the desired angular velocity comprises:

deriving an actual angular velocity of the member from the first parameter (col. 4, lines 18-23);

generating first error value corresponding to a difference between the actual angular velocity and the desired angular velocity (col. 4, lines 31-34 and Fig. 3, element 360); and

adjusting the desired angular velocity in response to the first error value to produce a corrected desired angular velocity which is employed in operating the first actuator (col. 4,lines 35-44 and Fig. 1, element 140).

29. As per claim 23, Brandt discloses operating the second actuator comprises converting the desired length velocity for the member into a desired second velocity for the second actuator (col. 4, lines 37-44 and Fig. 1, element 150).

30. As per claim 24, Brandt discloses converting the desired length velocity comprises:

deriving an actual length velocity of the member from the second parameter (col. 4, lines 18-20);

generating second error value corresponding to a difference between the actual length velocity and the desired length velocity (col. 4, lines 31-34); and

adjusting the desired length velocity in response to the second error value to produce a corrected desired length velocity which is employed in operating the second actuator (col. 4, lines 35-44 and Fig. 1, element 150).

31. As per claim 25, Brandt discloses a control system for a member which is movable by first and second actuators that respectively control an angle of the member relative to a reference and a length of the member, the control system comprising:

an input apparatus (Fig. 2, element 270) that produces a command designating a desired velocity of a point on the member along a desired substantially straight line path (col. 3, lines 20-23 and col. 4, lines 5-10);

a transformation function coupled to the input apparatus and converting the command into an angular velocity (col. 3, lines 58-61 and col. 4, lines 40-44) and a length velocity for the member (col. 3, lines 58-61 and col. 4, lines 40-44);

a first converter which translates the angular velocity for the member into a first velocity at which the first actuator is to move (col. 3, lines 58-61, col. 4, lines 40-44 and Fig. 1, element 140);

a first driver for operating the first actuator in response to the first velocity to alter the angle of the member (col. 2, lines 58-60, col. 4, lines 37-44, col. 7, lines 64 and 66-67 and col. 8, lines 1-5); and

a control element (Fig. 2, element 250) for operating the second actuator in response to the length velocity to alter the length of the member (col. 2, lines 60-63, col. 3, lines 50-55, col. 4, lines 37-44, col. 7, lines 65-67 and col. 8, lines 1-2 and 6-8).

32. As per claim 26, Brandt discloses command produced by the input apparatus designates a first desired velocity along a first axis and a second desired velocity along a second axis that is substantially orthogonal to the first axis (col. 3, lines 16-26 and col. 7, lines 8-12 and 57-61).

33. As per claim 27, Brandt discloses the control element comprises:

a second converter which translates the length velocity for the member into a second velocity at which the second actuator is to move (col. 3, lines 58-61, col. 4, lines 40-44 and Fig. 1, element 140); and

a second driver for operating the second actuator in response to the second velocity to alter the length of the member (col. 2, lines 60-63, col. 4, lines 37-44, col. 7, lines 65-67 and col. 8, lines 1-2 and 6-8).

34. As per claim 28, Brandt discloses the control system as set forth above further comprising:

a first sensor (Fig. 2, element 210 and 220) that produces a first signal indicating a first parameter which denotes the angle of the member relative to a reference (col. 3, lines 31-33);

a second sensor (Fig. 2, element 210 and 230) producing a second signal that denotes the length of the member (col. 3, lines 34-37);

a first differentiator that derives an actual angular velocity of the member from the first signal (col. 4, lines 18-20);

a second differentiator that derives an actual length velocity of the member from the second signal (col. 4, lines 18-20);

an angle controller which generates first error value corresponding to a difference between the actual angular velocity and the desired angular velocity (col. 4, lines 31-34 and Fig. 3, element 360);

a length controller which generates second error value corresponding to a difference between the actual length velocity and the desired length velocity (col. 4, lines 31-34 and Fig. 3, element 360);

a first adjusting element that alters the desired angular velocity in response to the first error value to produce a corrected desired angular velocity which is applied to the first converter (col. 4, lines 35-44); and

a second adjusting element that alters the desired length velocity in response to the second error value to produce a corrected desired length velocity which is employed by the control element in operating the second actuator (col. 4, lines 35-44).

Claim Rejections - 35 USC § 103

35. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

36. Claim 8, 14 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandt in view of U.S. Patent No. 4,332,517 (hereinafter Igarashi).

37. As per claim 8, Brandt does not expressly teach to transforming the command utilizes the relationships defined by the equations:

[dot over (X)]=cos(.theta.+.gamma.)[dot over (L)]+(-L sin(.theta.+.gamma.)+ d cos(.theta.+.gamma.))([dot over (.theta.)]+[dot over (.gamma.)]) [dot over (Y)]=sin(.theta.+.gamma.)[dot over (L)]+(L cos(.theta.+.gamma.)+ d sin(.theta.+.gamma.))([dot over (.theta.)]+[dot over (.gamma.)]) where [dot over (X)] is velocity of the point on the member along the first axis, [dot over (Y)] is velocity of the point on the member along the second axis, .theta. is the angle of the member, [dot over (.theta.)] is the angular velocity of the member, .gamma. is a pitch angle of a machine on which the member is mounted, [dot over (.gamma.)] is an angular pitch velocity of the machine, [dot over (L)] is a rate at which the length of the member is changing, and d is a distance that the point is offset from a longitudinal axis of the member.

Igarashi teaches to using a transforming command (col. 1, 57-63. lines col. 5, lines 1-67 and col. 6, lines 1-35).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to modify the teaching of Brandt to include transforming the command to improve the stability, accuracy and response to the feedback control system (col. 6, lines 58-59).

38. As per claim 14, Brandt does not expressly teach generating a first error value and generating a second error value both utilize a proportional-integral-derivative control function.

Igarashi teaches to using a PID controller (col. 6, lines 60-61).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to modify the teaching of Brandt to include a PID controller to improve the stability, accuracy and response to the feedback control system (col. 6, lines 58-59).

39. As per claim 19, Brandt does not expressly teach generating a first error value and generating a second error value both utilize a proportional-integral-derivative control function.

Igarashi teaches to using a PID controller (col. 6, lines 60-61).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to modify the teaching of Brandt to include a PID controller to improve the stability, accuracy and response to the feedback control system (col. 6, lines 58-59).

Response to Arguments

40. Applicant's arguments see Remarks pgs. 16-20, filed with respect to claims 1-7, 9-13, 15-18 and 20-28 under U.S.C. 102(b) have been fully considered but they are not persuasive.

41. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "the first actuator that pivots the member") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

42. Applicant argues that the prior art fails to teach, "Brandt et al. uses flow control and importantly does have the third step of the present method in that it does not determine a desired first velocity for the first actuator that pivots the member". The examiner respectfully disagrees.

Note: The Examiner has interpreted the statement as "Brandt et al. uses flow control and importantly does **not** have the third step of the present method in that it does not determine a desired first velocity for the first actuator that pivots the member."; believing the statement contains a typographical error.

Brandt discloses (col. 2, lines 58-60), "The angle of the boom 160 with respect to the frame 130 is controlled by a first actuator 140 connected between the frame 130 and the boom 160."

(col. 4, lines 37-44), "The desired velocity requests, represented in Cartesian coordinates, are transformed at control box 370 into corresponding polar coordinates based on the position and orientation of the boom 160. The output of the Cartesian to polar transform control box 370 is the desired angular velocity of the boom 160, which is controlled by the first actuator 140, and the desired linear velocity of the boom 160, which is controlled by the second actuator 150."

(col. 7, line 64), "a first actuator associated with the boom;"

(col. 7, lines 66-67 and col. 8, lines 1-2), "wherein the control system is adapted for actuating the first actuator and the second actuator as a function of the desired angular velocity and the desired linear velocity, respectively."

(col. 8, lines 3-5), "An apparatus, as set forth in claim 10, wherein the first actuator is adapted for controlling an angle of the boom relative to the frame."

(col. 4, lines 64-67), "Preferably, the desired and actual velocity ratios represent the desired and actual velocities of the first actuator 140, relative to the desired and actual velocities of the second actuator 150."

43. Applicant argues that the prior art teaches, "flow percentages do not indicated the absolute amount of flow to each actuator as the total available flow being apportioned varies with changes in pump output and fluid consumption by other actuators on the machine. Since the absolute flow to each actuator varies, so too does each actuator's velocity." This relationship between the velocity and actuator is not excluded by the claim limitations; hence, the Brandt reference meets the claim limitations.

(col. 4, lines 64-67), "Preferably, the desired and actual velocity ratios represent the desired and actual velocities of the first actuator 140, relative to the desired and actual velocities of the second actuator 150."

44. Applicant argues that the prior art fails to teach, "the angular velocity of the Brandt et al. boom is not the velocity of the linear actuator that produces the angular boom velocity. Although angular boom velocity is geometrically convertible to the linear velocity of the piston rod with respect to the cylinder of the actuator 140, that

conversion is not performed by Brandt et al. and nowhere does its method derive a desired first velocity for the first actuator 140." The examiner respectfully disagrees.

(col. 4, lines 37-44), "The desired velocity requests, represented in Cartesian coordinates, are transformed at control box 370 into corresponding polar coordinates based on the position and orientation of the boom 160. The output of the Cartesian to polar transform control box 370 is the desired angular velocity of the boom 160, which is controlled by the first actuator 140, and the desired linear velocity of the boom 160, which is controlled by the second actuator 150."

(col. 7, line 64), "a first actuator associated with the boom;"

(col. 7, lines 66-67 and col. 8, lines 1-2), "wherein the control system is adapted for actuating the first actuator and the second actuator as a function of the desired angular velocity and the desired linear velocity, respectively."

(col. 8, lines 3-5), "An apparatus, as set forth in claim 10, wherein the first actuator is adapted for controlling an angle of the boom relative to the frame."

45. Applicant argues that the prior art fails to teach, "defin(ing) the velocity of the first actuator that pivots the member 160". The examiner respectfully disagrees.

Brandt discloses (col. 2, lines 58-60), "The angle of the boom 160 with respect to the frame 130 is controlled by a first actuator 140 connected between the frame 130 and the boom 160."

(col. 4, lines 37-44), "The desired velocity requests, represented in Cartesian coordinates, are transformed at control box 370 into corresponding polar coordinates based on the position and orientation of the boom 160. The output of the Cartesian to polar transform control box 370 is the desired angular velocity of the boom 160, which is controlled by the first actuator 140, and the desired linear velocity of the boom 160, which is controlled by the second actuator 150."

(col. 7, line 64), "a first actuator associated with the boom;"

(col. 7, lines 66-67 and col. 8, lines 1-2), "wherein the control system is adapted for actuating the first actuator and the second actuator as a function of the desired angular velocity and the desired linear velocity, respectively."

(col. 8, lines 3-5), "An apparatus, as set forth in claim 10, wherein the first actuator is adapted for controlling an angle of the boom relative to the frame."

46. Applicant argues that the prior art fails to teach, "the desired velocity at which the point on the member is to move along a straight line is transformed into the

velocities at which the first and second actuators must operate to move the point as desired. The examiner respectfully disagrees.

(col. 3, lines 16-27), "The operator-controlled joystick 270 delivers a desired velocity signal to a control system 240 located on the work machine 100, in response to movement of the joystick 270 along predefined axes. In the preferred embodiment, the joystick 270 has two degrees of movement. Left and right movement of the joystick 270 along a first axis (x axis) provides linear horizontal motion of the load-engaging member 180 at the pivoted connection 164. Likewise, forward and backward movement of the joystick 270 along a second axis (y axis) perpendicular to the first axis, provides linear vertical motion of the load-engaging member 180 at the pivoted connection 164."

(col. 4, lines 4-10) "Referring now to FIG. 3, a block diagram of the control system 240 is shown. The input commands, which are generated by the input device 270, are shown as desired velocity requests. The input commands are in Cartesian coordinates, and represent the desired x and y velocity of the boom 160 corresponding to the desired speed and direction of movement of the fork 180."

(col. 7, lines 8-12) "an input device adapted for delivering a desired velocity signal indicative of a desired velocity of the load-engaging member, the desired velocity including a desired angular velocity and a desired linear velocity; and"

(col. 7, lines 57-61), " An apparatus, as set forth in claim 1, wherein the input device is adapted for commanding a desired velocity of the boom along a first axis, and a desired velocity of the boom along a second axis, wherein the first axis is perpendicular to the second axis."

47. As per claim 5, Applicant argues that the prior art fails to teach, "Brandt never derives a desired first velocity of the first actuator 160". The examiner respectfully disagrees.

(col. 4, lines 37-44), "The desired velocity requests, represented in Cartesian coordinates, are transformed at control box 370 into corresponding polar coordinates based on the position and orientation of the boom 160. The output of the Cartesian to polar transform control box 370 is the desired angular velocity of the boom 160, which is controlled by the first actuator 140, and the desired linear velocity of the boom 160, which is controlled by the second actuator 150."

(col. 7, line 64), "a first actuator associated with the boom;"

(col. 7, lines 66-67 and col. 8, lines 1-2), "wherein the control system is adapted for actuating the first actuator and the second actuator as a function of the desired angular velocity and the desired linear velocity, respectively."

(col. 8, lines 3-5), "An apparatus, as set forth in claim 10, wherein the first actuator is adapted for controlling an angle of the boom relative to the frame."

(col. 4, lines 64-67), "Preferably, the desired and actual velocity ratios represent the desired and actual velocities of the first actuator 140, relative to the desired and actual velocities of the second actuator 150."

Furthermore, Applicant argues that the prior art teaches, "the desired angular velocity for the member 160 is converted directly into a percentage of fluid flow to be applied to the first actuator 140." This relationship between the velocity and actuator is not excluded by the claim limitations; hence, the Brandt reference meets the claim limitations.

48. As per claim 10, Applicant argues that the prior art fails to teach, "a dimension of an actuator sensed for this length determination". The examiner respectfully disagrees.

(col. 3, lines 34-37) "The position sensor 210 also includes a length sensor 230 adapted for sensing the length or extension of the telescopic member 170 of the boom 160, and responsively delivering a boom length signal."

(col. 4, lines 4-10) "Referring now to FIG. 3, a block diagram of the control system 240 is shown. The input commands, which are generated by the input device 270, are shown as desired velocity requests. The input commands are in Cartesian coordinates, and represent the desired x and y velocity of the boom 160 corresponding to the desired speed and direction of movement of the fork 180."

(col. 4, lines 14-17) An actual position of the load-engaging member 180 is determined at control box 320 as a function of the boom angle signal, the boom length signal, and the inclination signal.

49. As per claim 15, Applicant argues that the prior art fails to teach, "derive the actual boom angle by sensing a dimension of first actuator 140". The examiner respectfully disagrees.

(col. 3, lines 31-33) "The position sensor 210 includes an angle sensor 220 adapted for sensing the angle of the boom 160 relative to the frame 130, and responsively delivering a boom angle signal."

(col. 4, lines 4-10) "Referring now to FIG. 3, a block diagram of the control system 240 is shown. The input commands, which are generated by the input device 270, are shown as desired velocity requests. The input commands are in Cartesian

coordinates, and represent the desired x and y velocity of the boom 160 corresponding to the desired speed and direction of movement of the fork 180."

(col. 4, lines 14-17) An actual position of the load-engaging member 180 is determined at control box 320 as a function of the boom angle signal, the boom length signal, and the inclination signal.

50. As per claim 17, Applicant argues that the prior art fails to teach, "sens(ing) a dimension of the second actuator". The examiner respectfully disagrees.

(col. 3, lines 34-37), "The position sensor 210 also includes a length sensor 230 adapted for sensing the length or extension of the telescopic member 170 of the boom 160, and responsively delivering a boom length signal."

(col. 4, lines 4-10), "Referring now to FIG. 3, a block diagram of the control system 240 is shown. The input commands, which are generated by the input device 270, are shown as desired velocity requests. The input commands are in Cartesian coordinates, and represent the desired x and y velocity of the boom 160 corresponding to the desired speed and direction of movement of the fork 180."

(col. 4, lines 14-17), "An actual position of the load-engaging member 180 is determined at control box 320 as a function of the boom angle signal, the boom length signal, and the inclination signal."

51. As per claim 18, Applicant argues that the prior art fails to teach, "deriving an actual velocity of the actuator 140 that produces an angular change of the boom". The examiner respectfully disagrees.

(col. 4, lines 18-23), "The actual position of the load-engaging member 180 is transformed at control box 330 into an actual angular velocity and an actual linear velocity. More specifically, the actual angular velocity is determined by computing the derivative of the boom angle signals, as sensed by the angle sensor 220."

52. As per claim 20, Applicant argues that the prior art fails to teach, "converting the desired angular velocity for the member into a desired first velocity of the first actuator". The examiner respectfully disagrees.

(col. 4, lines 37-44), "The desired velocity requests, represented in Cartesian coordinates, are transformed at control box 370 into corresponding polar coordinates based on the position and orientation of the boom 160. The output of the Cartesian to

polar transform control box 370 is the desired angular velocity of the boom 160, which is controlled by the first actuator 140, and the desired linear velocity of the boom 160, which is controlled by the second actuator 150."

(col. 7, line 64), "a first actuator associated with the boom;"

(col. 7, lines 66-67 and col. 8, lines 1-2), "wherein the control system is adapted for actuating the first actuator and the second actuator as a function of the desired angular velocity and the desired linear velocity, respectively."

(col. 8, lines 3-5), "An apparatus, as set forth in claim 10, wherein the first actuator is adapted for controlling an angle of the boom relative to the frame."

53. As per claim 21, Applicant argues that the prior art fails to teach, "sens(ing) a dimension of an actuator". The examiner respectfully disagrees.

(col. 3, lines 34-37) "The position sensor 210 also includes a length sensor 230 adapted for sensing the length or extension of the telescopic member 170 of the boom 160, and responsively delivering a boom length signal."

(col. 4, lines 4-10) "Referring now to FIG. 3, a block diagram of the control system 240 is shown. The input commands, which are generated by the input device 270, are shown as desired velocity requests. The input commands are in Cartesian coordinates, and represent the desired x and y velocity of the boom 160 corresponding to the desired speed and direction of movement of the fork 180."

(col. 4, lines 14-17), "An actual position of the load-engaging member 180 is determined at control box 320 as a function of the boom angle signal, the boom length signal, and the inclination signal."

54. As per claim 25, Applicant argues that the prior art fails to teach, "a first converter which translates the angular velocity for the member into a first velocity at which the first actuator is to move". The examiner respectfully disagrees.

(col. 3, lines 58-61), "The controller 260 automatically coordinates the flow of hydraulic fluid to both the first and second actuators 140,150, in response to the command signal."

(col. 4, lines 40-44), " The output of the Cartesian to polar transform control box 370 is the desired angular velocity of the boom 160, which is controlled by the first

actuator 140, and the desired linear velocity of the boom 160, which is controlled by the second actuator 150."

(col. 4, lines 64-67), "Preferably, the desired and actual velocity ratios represent the desired and actual velocities of the first actuator 140, relative to the desired and actual velocities of the second actuator 150."

55. Applicant's arguments see Remarks pg. 21, filed with respect to claims 8, 14 and 19 under U.S.C. 103(a) have been fully considered but they are not persuasive.

56. As per claim 8, Applicant argues that the prior art fails to teach, "the pitch angle of the machine on which the member is mounted and the angular pitch velocity. The examiner respectfully disagrees.

(col. 1, lines 57-62), "According to a principle similar to that of the equations (1) through (3), the amounts of operation (corresponding to the angles .alpha., .beta. and .gamma. or the angular velocities .alpha., .beta. and .gamma.) of the hydraulic cylinders 4, 5 and 6 necessary for straight excavation are calculated from these conditions and the angles .alpha., .beta. and .gamma. outputted by detectors."

(col. 5, lines 9-15), "In order to maintain the bucket excavation angle unchanged, the following equation (4) or (5) must be satisfied:

.alpha.+.beta.+.gamma.=constant (4)

.alpha.+.beta.+.gamma.=0 (5)

In order to carry out the straight excavation, the equation (3) described above or the following equation (6) must be satisfied:

y=M.multidot.x (6)

where .y=dy/dt and .x=dx/dt (t designates the time)". Hence, .x and .y represent velocity, i.e., the time rate of change of displacement.

57. Claims 8, 14 and 19 stand rejected under U.S.C 103(a) as set forth above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following references are cited to further show the state of the art with respect a control system for a construction machine.

U.S. Patent Publication No. 2007/0021895 discloses a status monitoring system for a work machine includes at least a first monitoring device coupled to a first

component of the work machine and at least a second monitoring device coupled to a second component of the work machine.

U.S. Patent No. 5,201,177 discloses a system for automatically controlling the actuators of a construction vehicle.

U.S. Patent No. 5,218,895 discloses an apparatus adapted to controllably position a movable element in hydraulic motor.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer L. Norton whose telephone number is 571-272-3694. The examiner can normally be reached on 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 571-272-3687. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anthony Knight
Supervisory Patent Examiner
Art Unit 2121